REDEEMER
UNIVERSITY COLLEGE

the Armitt
Collection

Charlotte Mason's House of Education,
Scale How, Ambleside, UK, 2009

The **Charlotte Mason Digital Collection** is a not-for-profit database created in 2009-2011 to assist scholars, researchers, educators and students to discover, use, and build upon the Charlotte Mason Collection of archives, journals and books housed in the Armitt Library & Museum (UK). To learn more about this database or to search the digital collection, go to The Charlotte Mason Digital Collection.

Your use of images from the **Charlotte Mason Digital Collection** is subject to a License. To publish images for commercial purposes, a license fee must be submitted and permission received prior to publication. To publish or present images for non-profit purposes, the owner, Redeemer University College, must be notified at cmdc@redeemer.ca and submission of a copy of the context in which it was used also must be submitted to the owner at cmdc@redeemer.ca. Credit lines, as specified in the License, must accompany both the commercial and non-profit use of each image.

Unless you have obtained prior permission, you may not download an entire issue of a journal nor may you make multiple copies of any of the digital images. Higher resolution images are available. [Low resolution (150 dpi), single copy printing is permitted: High resolution images for publication can be purchased. Please contact Redeemer University College in writing as specified in the License to request high resolution images.

While the document originals are housed in the Armitt Library & Museum, Redeemer University College owns the rights to the Digital Images (in jpg/pdf format) of the original archival documents and artifacts. The original Digital Images and database metadata are owned and maintained by Redeemer University College. Multiple images are bound together in PDF Packages. Click here to download the latest version of Adobe Reader for better viewing. In the PDF, click an image thumbnail to view it.

This project was made possible through collaboration among the Armitt Library & Museum (Ambleside, UK), Redeemer University College (Ancaster, Canada) and the University of Cumbria (UK) and with the financial assistance of the Social Sciences and Humanities Research Council of Canada.

Need help? If you do **not** see a side-bar with image thumbnails:
Some of the PDF packages are large and will take some time to download. A very large PDF package may open more successfully if you download it first to your desktop. (From inside the database record, right-click on the link to the PDF package and save the link to your desktop.) Once it's on your desktop, you can open it up with a recent version of Adobe Reader.

If you have a Macintosh with Safari, the default program to open PDFs is Preview, which does not open the PDF packets. Mac users need to download Adobe Reader. If this cover page appears without a list of PDF files (either at the side or bottom of the screen), look for a paper clip or a menu option to view attachments. If you click that, you should see a list of the pages in the PDF package.

Viewing files with Linux: This works with the default PDF viewer that comes pre-installed with Ubuntu. While viewing this cover page in the PDF viewer, click "View" on the top toolbar, and check the box that says "Side Panel". That will bring up the side panel. The side panel will show only this cover page. Click the 'arrow' at the top of the side panel, and it will give you the option to view "attachments." If you click that, you should see a list of PDF files, which are the pages in the PDF package.

Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

DIGESTION AND DIET.

By Ralph W. Wilson, M.D.

(Continued from page 765.)

The energy expended in the act of digestion is also a matter to be considered; for, some foods require more digestive energy to be expended upon them than others, and milk is one that ranks among the easiest.

The most important elements which our bodies contain are C and N (carbon and nitrogen), and the waste of these, on an average, for a healthy man, in the day, amounts to ¾ oz. of nitrogen and about 10 oz. of carbon. This amount must, therefore, be supplied to the body, and we give it in the form of food. Now, although this amount will suffice for the needs of an ordinary man, if we thrust more upon him, more N for example, in the form of proteid, the body will be equal to the task of casting it out again—so that consumption and excretion preserve an equilibrium in the body. These nitrogen-bearing proteids are the builders and repairers of the tissues; but they supply energy as well. And a question arises here as to whether it would be best for the health of the body to supply it with just that amount of proteid which it requires for repair and increase of tissues, or, to give it an excess over its minimum requirements? If the body is a healthy one it will not matter much if slight excess is given; it will only throw more work on the excreting organs, and our organs in general work well within their powers. But, if the excretory organs are diseased it will matter a good deal. If we take the exact amount of proteid needed for repair only, then we have to trust exclusively to the carbo-hydrates and fats for our sources of energy, *i.e.*, for the production of heat and work. And there is a fact connected with this which is interesting and good to bear in mind, namely, that when carbo-hydrates and fats are taken along with proteid food they are made use of by the

body preferably to the proteid in the production of energy at the moment, the proteids are spared and put by for repairs.

Now, the proteid element of food is the one most easily broken down, the carbo-hydrates less easily, and fats the most difficult of the three. If they are all administered in equal proportion there will be the greatest consumption of proteid. We saw that it was different when the carbo-hydrates and fats were in excess. This is due, according to Robert Hutchison, to "crowding out." The "mass influence" of carbo-hydrates and fat exclude much of the proteid matter from coming into contact with the living cells, yet this exclusion of proteid can never be done completely, even where there is a great excess of carbo-hydrate, which, in its turn, is more easily broken up than fat.

This has a direct bearing on vegetarianism, and the question as to whether or not we should restrict proteid matter to the mere repair of tissue, and get all our work and heat out of carbo-hydrates and fats, is answered by Hutchison in the negative. He says, "It is well to have an excess of proteid above that barely required for tissue-repair. To live on a minimum of proteid is to run the risk of what one may call 'thread-bare tissues,' and of having no reserve for use in emergencies. And such a condition of things makes for low resistance and disease." He says also, "there is reason to believe that proteid, besides acting as a repairer of tissue and a source of energy, exerts upon the cells a stimulating influence, which increases vitality and energy."*

A distinction may be made between muscular strength and nervous energy. Muscular strength necessitates the consumption of carbo-hydrates, and nervous energy, proteids. Sustained effort is kept up on carbo-hydrates, that is, farinaceous foods, but a sudden and fiercer effort for a shorter time can be obtained from the proteids of meat. Examples to prove this among the lower animals are plentiful. For brain work, then, an animal diet in small but rather frequently repeated quantities is the best, and next to this, a diet of those vegetable substances which contain proteids, like peas, beans and oatmeal. There seems to be another beneficial effect of the proteids of butcher's meat, and this is, the keeping up of a high standard of resisting power against disease. A meat diet has an actually stimulating effect on the tissues, it increases oxidation, lessens the accumulation of fat, and promotes vigour in all directions. It seems to increase one's vital capital, and the beneficial effects of it are seen during convalescence from acute diseases, where meat-eaters, everything else being equal, outstrip vegetarians in recovery.

---

* *Food and the Principles of Dietetics*, by Robert Hutchison, M.D., etc. (Arnold).

During the growth of childhood a liberal meat dietary is a necessity. If it is deficient, the effects will be seen in diminished growth and faulty development.

For safety in health it may be said that an ordinary person ought to consume not less than about 120 grammes of proteid matter in the day, that is, about 4 ounces avoirdupois.

As to carbo-hydrates and fats, nearly three times as much of these should be taken; and although the work done by means of them is the same in kind, one should not forget that fat is 2¼ times greater in energy production than carbo-hydrates, but much more difficult for the body cells to deal with and break up. To take either exclusively would be a mistake; for, the digestive organs are prepared to deal with a fair proportion of both. The proportion, however, will differ in different individuals, and in different nationalities, according to climatic and other conditions of life. Excess of carbo-hydrates is apt to produce fermentation and flatulency, whilst excess of fats will produce sickness and diarrhœa.

In different periods of life, probably requirements change. It is generally believed that young children require more fat, proportionately, than their seniors. A deficiency of the fatty element in babies' food, at least, appears to foster rickets and disease in many cases. As an infant's existence is rather a passive one, it requires less of the carbo-hydrates than it will require when it begins to run about. What it does require is proteid matter to build up its actively growing tissues. The need for fats is chiefly to keep it warm, for a baby has a larger superficies, proportionate to its bulk, than an ordinary grown-up person; therefore, the loss of heat from it is greater, and heat-producers are needed. A baby well wrapped up will need a little less cream than one exposed, and less strain is thereby put upon its digestive organs.

An excess of proteid matter soon upsets the stomach and bowels of infants; but fats, in the shape of cream, can be taken in greater relative quantity.

Carbo-hydrates are of the greatest importance in older children who are active. So far as sugar is concerned there may, perhaps, be a tendency to consume it in excess. If this is done, fermentation in the intestines results with pain.

In early life certain mineral ingredients are also essential—phosphate of lime is required for the bones, and phosphate of potash for blood and muscles. Water, too, is very important, as three-fourths of the whole body is made up of it.

A diet containing the exact proportions of all the elements of food seems to be, then, what we should aim at, but even this would not be the best for us. The human organism has not been evolved on such ideal lines. In the struggle for existence, animal life has had to put up with much that was not ideal, and its evolutionary powers have been equal to the task of dealing with many adverse conditions. The mechanism for dissociating the harmful from the good, and of getting rid of that which was unnecessary in diet, has reached a high state of development in the human body. The excretory organs can deal with greater difficulties than the mere getting rid of the products of tissue-waste. Food of the most unsuitable kind can be taken and dealt with for long periods of time, and only the good elements in it be made use of, whilst the bad is cast out; but this can only be done at a cost. And should our knowledge ever increase, and our brains outstrip in evolutionary development the rest of our bodies, to the degree that we should be able to provide a chemically ideal pabulum for food, each element of it being in the exact proportion required, even then we should suffer; for, our eliminating organs as at present constituted, would have too little work to do. The consequence would be that the balance of things would be destroyed if we tried the change suddenly; the internal economies would be disturbed, and something of the nature of a revolution would take place among our anatomical parts.

Changes do take place, both in the nature of the food we eat and in ourselves who eat it; but, they are brought about slowly, and the period of a single life-time is as a moment for any radical change to be accomplished.

A person, therefore, who suddenly adopts some novel system of dietary to fit a new philosophy or creed, puts a strain upon some group of organs which *may* result in disease. The safest course to follow, then, is, that on the old and well-tried lines of a mixed diet.

The question is often raised as to whether a purely vegetarian diet is equal to, or, possibly, better than, an ordinary meat diet; and there is a lurking belief in the minds of many people that the vegetarian is the simpler and better of the two, and they would adopt it if they could only be assured that it promotes as much vigour of body as a mixed diet with meat does; its relative cheapness, too, increases the temptation.

Well, it has been shown that all the elements of nutrition *are* contained in a vegetable diet, and by experiment it has been proved that the balance of nitrogen in the body is not disturbed by exchanging the proteid of meat for the proteid of peas and beans. It is with the proteid element that the trouble, if any, would arise. The chief objection to it, therefore, must be the bulk required to be consumed to get the proper amount of proteid needed. As lean beef, after the water has been removed, contains nearly 90 per cent. of proteid, whilst fat beef contains 50 per cent.; pea flour on the other hand contains only 27, wheat 16, and rice 7 per cent. And besides this defective *amount* of proteid, in vegetable food its *absorbability* is less than the proteid of flesh.

As a healthy man requires 100 to 130 grammes of proteid matter to do an average day's work, what would be the result if he reduced it much? The answer which must be given is, that it would lower his standard of health.

It is certainly the case in growing children that the lowering below a certain point of proteid results in impaired growth. In the matured man results are not so readily seen. One effect is, however, distension of the stomach region owing to the increased capacity of the gastric organ which is induced by taking the more bulky food. The power of the organ seems to be lowered also in the consistent vegetarian, and acid fermentation goes on within. The worker out-of-doors, however, would suffer less from it than a man of sedentary habits. But viewed in the light of its nutrient value, and

the proportion of nutrients it contains, it seems to be an inferior dietary to a mixed one with butcher's meat for any ordinary healthy man, and still more so for growing children.

Though I must adhere to the lines I laid down at the beginning of this paper, namely, to deal with general principles, I will, out of the many articles of diet consumed by us, select a very few for particularization. And the first will be the group of foods derived from the animal kingdom.

Meats are substances with a definite structure, and if we examine them minutely we find that they are composed of little fibres visible to the naked eye. If we examine them more minutely with a microscope we find these fibres to be made up of bundles of little tubes bound together by a connective tissue. First of all these fibre-like tubes are of different lengths; in fish they are long and in fowls they are short; in old animals they are tough and in the young more tender. If we examine the contents of these tubes we find them to be proteids, salts and extractives held in a watery solution. The walls of the tubes are albuminoid matter (elastin), and the tissue binding them together is a gelatinous material. Mixed up with these bundles and lying between them, there is a varying degree of fat. Now all this forms a highly nutritious mixture. The question of digestibility, however, comes in. Those meats with the shortest fibres are the most digestible, and by cutting across the fibre in carving less work will be given to the digestive organs to do.

When meat is new it is tough, but after a time it becomes tender owing to the formation of acids in it—this is due to putrefactive change at an early stage. We can simulate this process by immersing meat in vinegar and water for a while; and the vinegar in lobster salad is, therefore, scientifically correct, as the long tough fibres of such meat is rendered more digestible as well as better flavoured by the addition of an acid. The red colouring matter of muscle is *hæmoglobin*, a constituent of our red blood corpuscles, and this varies in quantity in different kinds of meat. *Myosin* is an important constituent of the juice; but the flavours are due to the *extractives*. These extractives have no nutritive value and they are extracted by boiling in water. The meat containing most fat is the least digestible, and pork and ducks, therefore, head the list in this respect. Only one quarter of the whole of meat is nutriment, three quarters are water. And the more water meat contains the less fat.

Now, what cooking does for meat is, to gelatinize the connective tissue which binds the fibres together, and this is the same effect as was seen to be brought about by acids. It also gets rid of water, and this is so whether the cooking be by roasting or boiling. It has the effect of raising the nutritive value of meat, which is the opposite of what takes place in the cooking of vegetables. Cooking, accordingly, has the effect of removing water, fat and extractives.

The difference between roasting and boiling, in nutritive effect, is very little. Extractives are boiled out, but these are only flavouring agents, and the actual nutritive value left is about the same.

In digestion, the first effect of gastric juice on these meat-fibres is to swell and soften them. Finally they split up into finer masses and eventually become pulp, which can be readily absorbed in the intestines.

Now, cooking probably makes meat less digestible. Experiment shows that raw meat is digested and absorbed in a shorter space of time than cooked meat, the difference for a small quantity of beef being: raw, 2 hours in leaving the stomach; half boiled, 2½ hours; wholly boiled, 3 hours; half roasted, 3 hours; wholly roasted, 4 hours.

Veal and pork are rightly considered indigestible, and chicken and game digestible, especially those parts which are least used by the birds in life.

Milk among animal foods is one of the greatest importance. Seeing that it is designed by nature for the feeding of the young, one may expect it to be of the highest value. It contains all the elements of nutrition, but the proportions of these in cow's milk are not right for the perfect feeding of man. The amount of proteid it contains is less than 3 per cent., but the chief of this is *casein*, which has extraordinary nutritive value. The fat, too, in the shape of cream, is in a remarkably fine state of division and is, therefore, easy of absorption. Another carbo-hydrate in it is milk-sugar, which has very little sweetness. It does not undergo fermentation by yeast readily; but it is acted upon easily by certain microbes, and the sourness which generally results is due to the presence of lactic acid. It also contains mineral matter in the shape of phosphate of lime and phosphate of potash; and another constituent is citric acid combined with lime. Then comes water, which amounts to 88 per cent. of the whole. It can be coagulated by rennet, and the casein forms a clot which entangles the cream. This is junket.

But milk can be curdled also by the addition of lactic acid. And, there are present, normally, in milk certain bacteria which bring about this change; these are stimulated into activity by electrical states of the air, hence the souring of milk in a thunder-storm. But milk is also an ideal nidus for the development of microbes of disease, and the boiling of it is now generally advised to get rid of these; but boiling alters its composition and seems to render it less digestible to many people. Milk from a clean and healthy cow is probably quite sterile, but cows are often diseased and are the special victims of tuberculosis. It also very quickly becomes contaminated in the vessels which receive it. Safety, therefore, lies on the side of boiling it before use, even if its absorbability is lessened by the process.

One can only say, then, that cow's milk is not a perfect food for human beings. The proportions of its constituents being wrong for them, it must have additions for the adult and be modified as a food for babies. Compared with human milk it has more proteid, but less cream and less sugar.

Such food-stuffs as bread, cheese, eggs, and all the numerous luxuries that are indulged in must be passed over owing to the want of time to discuss them. The whole subject would occupy a course of many lectures. But one group of articles which enters into our dietary, and about which much misunderstanding exists, I will touch upon before closing, and that is, stimulants.

As a luxury indulged in to excess, one has nothing to say about alcoholic stimulation except in terms of condemnation; but, in its effects upon digestion it is so important that it cannot be left out of consideration. Undiluted alcohol is an irritant, but, mixed with water, it has effects, many of which are beneficial to digestion. In the proportion of about 2 per cent. to the amount of food under digestion, its effect is good rather than bad. In amounts from 5 to 10 per cent. it retards digestion, and 20 per cent. stops the process entirely. It does not alter the chemical processes of digestion to any appreciable degree ; its action is on the muscular apparatus concerned, and on the glandular activity.

Pepsin, for example, is not affected in its action on proteid matter by the presence of alcohol, and alcohol is very readily absorbed by itself. It is the peristaltic action of the gastric organ which is increased by it in the small quantities quoted above, and the secretion of gastric juice is increased also. Experiment seems to prove that a couple of tablespoonfuls of brandy, taken at meal-time, hastens digestion by about half-an-hour, and red wines act similarly. This, of course, applies to states of normal health—in some forms of disease it is even more valuable. And another thing to be said in its favour is, that it increases the absorption of other things. But though the act of digestion may be promoted by it, it does not increase the nutritive value of any food.

Its effects on the temperature of the body, the flushing of the skin with blood and other results on the nervous system, are subjects which do not come within the province of this paper. The only point it is desirable to bring out is, that alcohol *has* an effect on digestion, and that (in small quantities) not such a baneful one as has been supposed by those who have only dwelt upon the evils of intoxication. It does not alter the fact, however, that a healthy digestion has no need of it.

Perhaps an equally important member of the group of stimulants is tea. And here, in the presence of so many ladies, I am aware that I tread on dangerous ground. The active ingredients of tea are caffeine, tannic acid, and volatile oils. But in different samples and kinds these constituents vary a good deal. On infusion, which ought to be in water with plenty of air in it, and therefore in water that has not boiled long, the first ingredient that comes into solution is the caffeine, and a few minutes afterwards comes the tannic acid and extractives.

Coffee has practically the same composition as tea, but it is used in more concentrated form. The effects of both, however, are about the same so far as digestion is concerned.

And first, tea and coffee prevent the action of saliva on starch to a high degree, thus interfering with digestion in the mouth. Then, they retard digestion in the stomach, that is, the conversion of proteid into peptones ; and tea is a greater offender in this respect than coffee—Indian tea being worse than China tea—and probably the elements that do the harm are the tannic acid and the volatile oil.

Milk, however, counteracts these baneful influences, and plain-tea drinkers are, accordingly, at a disadvantage. Tea shows a tendency more than coffee to produce gas, and in acid, flatulent states, coffee should be taken in preference. Cocoa is better than both in this respect.

If tea is made strong, that is, with a lot of tannic acid infused out, and is taken alone, it is certainly apt to set up a state of gastric catarrh. Now, whilst the tannic acid of tea merely acts locally in the mouth and stomach, the caffeine on the other hand is absorbed and acts on the nervous system. Sensations are effected by it, and notably that of fatigue, which it overcomes. It also overcomes the feeling of heaviness which precedes sleep. Then, it stimulates both the circulation and breathing and, therefore, counteracts the effect of alcohol. But tea is not a food, and no one could live upon it, however great the quantity taken might be.

It used to be thought that it was a good beverage to drink whilst undergoing hard muscular exercise in order to prevent tissue-waste. This is now believed not to be the case, but on the contrary, that it increases waste of tissue. It is the feelings and sensations associated with hunger, fatigue and certain morbid states that it ministers to and overcomes. The insidious desire to have more and more of it is probably due to this soothing effect. In this it acts on the same lines as alcohol. But it does not produce the frenzies and brutalising effects that alcohol does when taken to excess.

As to the amount that can be taken without injury, probably as great a degree of variation exists among different people as in anything else that we indulge in. Those who have weak digestions to start with, and those who are of a neurotic disposition, should be on guard lest they take too much. Yet, at its worst, it cannot be compared for evil with excess in alcohol ; and within proper limits its use must be regarded as beneficent in a high degree. The foregoing observations apply chiefly to people in health; considerable modifications would have to be made for those in disease.

As a Union, I take it, we are concerned mostly with the bringing up of normal children, and the broad principles underlying their food and feeding ought to be studied by us. If the abnormal appears, that is more a matter for expert opinion, and we ought to know when to seek it. But so many traditional fallacies cling to us, even in the matter of dietetics, where personal experiment might have been expected to correct them, that a survey, such as we have taken to-night, cannot be out of place or unnecessary.

Perhaps I should apologise for having presented the subject in terms that, to some, may have seemed to be too technical; but I hope that I have shown that even technical things may be full of interest, and, if the desire to know more has been excited in anyone here I shall be fully rewarded for undertaking the task.

MOTHERS IN THE SCHOOLROOM.

By Mrs. W. Legge Symes.

The growing difficulty of obtaining good servants, the diminishing supply of young women for domestic service, must inevitably cause a revolution in the home life of the future. That the changes will be almost imperceptible in their growth will only cause them to be the more sure rooted, and it is well that all who realise the national value of the present system of English home life, should look ahead to see how the growing domestic difficulty is likely to affect it.

Though all sections of society are likely to be influenced, it is in the life of the middle class that the most radical changes will be wrought. The ineradicable vein of serfdom, combined with the peasant's thorough appreciation of its commercial value, will always adequately supply the upper ten thousand with good service; whilst the rough work needed by the lower sections, will mostly be cheerfully performed for a consideration, as a business transaction between equals. But the much disputed and ever varying line of distance between the serving and the served, combined with the sharing of the struggles of the employer, without the aims and benefits which animate her, has always bred trouble between the domestic servant of the middle class and her mistress, and now threatens to destroy any comfortable relations between them. Unfortunately it is this very class, likely to be hampered in its daily routine of domesticity, that will suffer so much more in consequence, than would the one beneath, or the one above. Left to itself it will not have the physical power to cope with its difficulties that the one would have, or the purse to command the outside piece-work which would be the resource of the other. And yet it is this very branch of society which it is most important to keep preserved in its little entirety. Hedged in as it is by the limitations of its means and position, it is the surest forcing house of national talent. If it is to become disorganised, and its members forced